

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A pipe molding system for producing plastic pipe, said system including a plurality of moving first mold block sections and second moving mold block sections, the first mold block sections closing with the second mold block sections to form a moving mold tunnel, means for feeding molten plastic to the first and second mold blocks sections to form the plastic pipe and a cooling plug for setting the plastic pipe in the moving mold tunnel, said cooling plug being divided into a first stage and a second stage, said first stage including a cooling circuit and control arrangement for removing sufficient heat from the plastic pipe to partially set the plastic pipe without excessive cooling thereof; said second stage including a cooling circuit and continuing to remove heat from the pipe to further set the plastic pipe; said first stage being separately controlled to be responsive to changing conditions of said first stage.
- 20 2. A pipe molding system as claimed in claim 1 wherein said cooling plug is divided into two separate cooling plug sections corresponding to said first stage and said second stage.
- 25 3. A pipe molding system as claimed in claim 2 including a thermal break member between said cooling plug sections.
- 30 4. A pipe molding system for producing plastic pipe, said system including a plurality of moving first mold block sections and second moving mold block sections, the first mold block sections closing with the second mold block sections to form a moving mold tunnel, means for feeding molten plastic to the first and second mold blocks sections to form the plastic pipe and a

- cooling plug for setting the plastic pipe in the moving mold tunnel, said cooling plug comprising a first cooling stage having a separate first cooling circuit and a second cooling stage having a separate second cooling circuit, said first cooling circuit including a first control arrangement for maintaining said first cooling stage within a first temperature range which cools the plastic pipe without damage from excessive cooling and reduces the temperature of the plastic pipe;
- 10                 said separate second cooling circuit including a control arrangement for continuing to removing heat from the plastic pipe for further setting of the plastic pipe.
- 15         5.         A pipe molding system as claimed in claim 4 wherein said first control arrangement includes an arrangement for monitoring the temperature of first cooling stage and adjusting the flow of a cooling medium circulated through said first cooling circuit in accordance with the temperature of said first cooling stage.
- 20         6.         A pipe molding system as claimed in claim 5 wherein said second control arrangement includes an arrangement for monitoring the temperature of said second cooling stage and adjusting the flow of a cooling medium circulated through said second cooling circuit in accordance with the temperature of said second cooling stage.
- 30         7.         A pipe molding system as claimed in claim 4 wherein said first cooling stage includes a reservoir of a cooling medium circulated through said first cooling stage, said reservoir including a temperature sensor and a chilling arrangement for maintaining the temperature of the cooling medium within a predetermined range, and a

pump and control arrangement for circulating sufficient cooling medium through said first cooling stage to maintain the temperature range of the first cooling stage regardless of the shape of the product as it passes over  
5 the first cooling stage.

8. A pipe molding system as claimed in claim 7 including a temperature sensor for monitoring the temperature of said first cooling stage and a variable  
10 control valve in said first cooling circuit with said variable control valve being varied in accordance with monitored temperature of said first cooling stage.

15 9. A pipe molding system for producing plastic pipe, said system including a plurality of moving first mold block sections and second moving mold block sections, the first mold block sections closing with the second mold block sections to form a moving mold tunnel, means for  
20 feeding molten plastic to the first and second mold blocks sections to form the plastic pipe and a cooling plug for setting the plastic pipe in the moving mold tunnel, the plastic pipe having a pipe wall with a first wall portion which travels over and is in contact with said cooling plug and a second wall portion which travels over and is spaced outwardly away from said cooling plug, the first wall portion transferring heat directly to and providing a first temperature control to prevent excessive plug cooling as the first wall portion travels  
25 over the cooling plug, said system including a second temperature control which operates to replace the first temperature control in preventing the excessive plug cooling as the second wall portion of the pipe wall travels over the cooling plug.

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10. The pipe molding system of Claim 9 wherein said

cooling plug is cooled by a supply of chilled water, said second temperature control comprising a water flow adjuster to reduce flow of the chilled water to the cooling plug when the second wall portion of the pipe 5 wall travels over the cooling plug.

11. The pipe molding system of Claim 9 wherein said cooling plug is cooled by a supply of chilled water, the chilled water being at a first temperature as the first 10 wall portion travels over the cooling plug, said second temperature control comprising a water temperature control which raises temperature of the chilled water above the first temperature as the second wall portion of the pipe wall travels over the cooling plug.

15 12. The pipe molding system of Claim 9 wherein said cooling plug is internally cooled by a supply of chilled water, said second temperature control comprising a heater externally of and directing heat onto said cooling 20 plug when said second wall portion of said pipe travels over said cooling plug, said heater being inactive when said first wall portion of the internal wall of the pipe travels over the cooling plug.

25 13. The pipe molding apparatus of Claim 9 wherein said system includes means to produce vacuum at the cooling plug when the first wall portion travels over the cooling plug to assist in maintaining the first wall portion in contact with the cooling plug, the means to produce 30 vacuum being turned off when said second temperature control is operated as the second wall portion of the internal wall of the pipe travels over the cooling plug.

35 14. The pipe molding system of Claim 9 wherein said cooling plug comprises first and second plug sections, said first plug section being subjected to the vacuum and

being temperature controlled only by the first temperature control of the heat of the first wall portion to prevent the excessive plug cooling as the first wall portion travels over the first plug section while, at the 5 same time, the second plug section is free of the vacuum and is subjected only to the second temperature control to prevent the excessive plug cooling as the second wall portion of the internal wall of the pipe travels over the second plug section, and then as the pipe moves along the 10 mold tunnel, said first plug section being free of vacuum and being temperature controlled only by the second temperature control to prevent the excessive plug cooling as the second wall portion of the internal wall of the pipe travels over the first plug section while, at the 15 same time, the second plug section is subjected to the vacuum and is temperature controlled only by the first temperature control of the heat of the first wall portion as the first wall portion of the internal wall of the pipe travels over the second plug section.